Illinois Mathematics and Science Academy
1500 Sullivan Road
Aurora, IL 60506-1000

Application For SIR Placement at Fermi National Accelerator Laboratory (FNAL)

(provide two recommendations – see rec form; please use a computer to complete this application legibly)

Name: Yu (Last) Brian (First) Austin (Middle) Date: 02/03/2015 (month / day / year)

Home Address: 732 Duxbury Lane (Number and Street)

Bartlett (City) IL (State) 60103 (Zip Code) Home Telephone: 630-246-7328 (include area code)

Person to be notified in an emergency: Peng Yu

Telephone (office hours): _____ (include area code) Telephone (other hours): _____ (include area code)

Student Cell Phone: _____ Year of Graduation: 2017

Suggested FNAL Advisor: _____

Gender: ☒ male ☐ female Age: 16 Country of Citizenship*: United States

*Citizens other than from the United States must complete the following information:

Permanent Resident: ☐ Yes ☐ No

Place of Birth: _____ (City, State, Country)

Passport No.: _____ Expiration Date: _____

All non-U.S. citizens must present their original, unexpired foreign passport on the first day of the program. Photocopies are not acceptable. Depending on your circumstances, you also must present:

- Form I-94 Arrival Departure Card that shows lawful admission to the U.S. and the end date of your "authorized stay", **PLUS**:
  - Form I-797 Notice of Action approving H-4, O-3, TD, E-3 or other nonimmigrant (temporary) visa status in the U.S. , OR
  - Form DS-2019 Certificate of Eligibility for J-2 status, OR
  - Form I-20 showing F-2 status, **OR**
- Greencard (Alien Registration Card, or I-551 Card) showing grant of lawful permanent resident status.

Describe your skills, abilities, proficiencies; please be honest.

Highest Math Level/Skill: Pre-calculus

Skill with Statistics: Finished Methods of Scientific Inquiry, a course dedicated on learning the process of data collection and analysis. I have learned about standard deviation, standard error, measures of central tendency, and many other statistical analyses including one-way ANOVA and two-way ANOVA.

Science Classes: Completed Physics, Chemistry, and Biology.

Describe Your Laboratory Skills: Have completed many different labs in my Physics, Chemistry, and Biology classes. I have worked with electric mechanisms and wind tunnels for physics, chemicals and gases in

chemistry, and glass plates and microscopes in biology. I have handled all of these listed materials with proper use and care, along with many more basic pieces of lab equipment such as lab goggles, pipettes, and flasks.

Prior Research (SIR) Experience (include advisor name/location): None

Computer Proficiency: Please indicate your skill level for each of the below.

	none	**introductory**	**Intermediate**	**advanced**
Basic			X	
C/C++		X		
Fortran	X			
Java		X		
Other Languages(list)	X			
Mathematica		X		
Matlab	X			
Other Programs (list)	X			
Unix(Linux)		X		
Windows			X	
Mac	X			
Other OS (list)	X			

Rank Your Interests (Do not rank any area that you would not be willing to pursue an investigation in.)

___Accelerator Component Testing, Theory and Design
_3__Astrophysics Data Analysis, Detector Development, Theory
_1_Computer Networking, Computing for Analysis, Data Analysis of Experiments, Computer Simulation and Modeling
_5_Detector Design and Testing
_2_Electronics Design and Testing
___Instrumentation and Diagnostics
___Radiofrequency (RF) Systems
___Magnet Systems
_4_Mechanical Design and Development
___Particle Physics Phenomenology
___Particle Physics Theory
___Superconducting Technology

Attach an application that includes the following items:

- Academic honors and awards that you have received. Please limit to ten or less honors/awards that you feel are the most significant.

  Numerous Chess Awards
  - Best Game against Master Chow
  - Aurora Central Catholic Tournament 1st place 2nd board
  - 1st place 5th Board Conference Tournament

- Extracurricular activities, interests, and any leadership role(s). Please limit to ten or less activities/interests that you feel are the most significant.

  Hearthstone Club (Co-President)
  Smash Club Board (Assistant to both President and Vice President)
  Chess Team (5^{th} board)

- Explain why research at FNAL would be a benefit to you and what you expect from participation in an investigation at FNAL. (Limit your answer to 250 words or less.)

I am a person who really enjoys working with science, and more so with physics as it is the most intriguing for me. I love to learn about new ideas and how and why do things work and at Fermilab, I can have a more in-depth knowledge on everything physics related, from particle accelerators, to how the machines inside work by tracking data and by their functions. I believe that it would be a great hands-on experience to be able to work with equipment and objects that I could sometimes have never been able to before, to even see how all of it works in action. At Fermilab, I would expect learning a lot about a certain kind of physics, such as sound with decibels and noises that could range from a bare silence to a large explosive, or by light in lumens with darkness and the sun, and learn more about the properties of each. We would mainly do this with experiments in which we collect and analyze data, whether by graphing it or by using the graph to make certain calculations or predictions. We could also understand more about physics with other numerous equations and furthermore recognize when we can apply them in daily life.

- What would you tell a FNAL scientist about yourself so that you would be selected to work with her or him? (Limit your answer to 250 words or less.)

I am a curious person, and I really enjoy learning about new topics, especially in the field of physics because it is my favorite science, and I enjoy reading and learning all about how much it affects us. For example, I often think about how all of us have gravity as we all have a mass, and that all of us affect the earth, even in ways that seem so miniscule. I also think about how big we are in comparison to all the quarks and atoms out there; to how small we are in comparison to the countless galaxies and nebulas, to the universe itself. I am interested in planetary science, and I am taking a course in it next semester to learn more about the effects of gravity. I also enjoy working with statistics and probability, collecting data for personal use a lot in order to see improvement in myself over many topics. I have become really organized, sorting my daily tasks consistently, along with supervising tournaments at library events and managing a club. Finally, I am a hardworking individual who will get the job done; spending many days perfecting a task that I have set for myself, making sure that the task is finished.

Explain one exceptional experience you had with STEM in the last year. (Limit your answer to 250 words or less.)

My most memorable experience with STEM was during the Fermilab Open House, where I was able to see and experience lots of physics experiments that were done by both students and scientists alike. While there were so many different activities to complete over at Fermilab, ranging from Mr. Freeze's demonstrations with liquid nitrogen, to riding on hovercrafts or looking at invisible particles using special types of lights, the one thing that stood out was the tour of the particle accelerator. I remembered looking at the machine that could move particles at the speed of light, and all the mechanical genius behind it, with thousands of machines that continued to operate on the particle accelerator, collecting lots of data that showed the movement of the particles in the accelerator. The scientist who led the tour also described the many ways it could be used, including treating cancer by proton therapy. With further research, I found that it could treat cancers such as skin cancer. It did this by breaking down the virus with the bonds between them breaking apart, killing most of the cancerous cells and reduced them to a minimal level. While it doesn't eliminate cancer outright, I found it really amazing how such small particles can destroy an extremely hazardous disease, with a method that seems almost perfectly safe.

Placement at FNAL also requires:

- Fermilab Visitor ID Form (form attached)
- Proof of Medical Coverage (form attached)
- Work Permit (required of students who are under 16 years of age)
- Documentation of Immigration Status (see first page)
- Authorization for Issuance of an ID Card (form attached)

- Student Registration (form attached)

- Note that some information is repeated on the attached forms, which will be filed with the appropriate offices at FNAL once a student has a specific placement.

I understand that by submitting this application for placement at the **Fermi National Accelerator Laboratory** *I may not apply for or seek other SIR opportunities until a decision has been made about this application. Placement for SIR at FNAL is not guaranteed by submission of this application.*

Peng Yu	5/27/15	Brian Yu	5/27/15
Signature of Parent/Guardian	Date	Signature of Applicant	Date

Student Name: YU, Brian Austin
Date of Birth: 10/19/1998
Entry Date: 08/14/2014

Illinois Mathematics and Science Academy
School Code:140177

		Sem1	Sem2	Credit
Y14-15				
Grade 10	Literary Explorations I	B		0.50
Grade 10	Literary Explorations II		B	0.50
Grade 10	American Studies	B+	B+	1.00
Grade 10	Mathematical Investigations III	C+		0.50
Grade 10	Mathematical Investigations IV		B	0.50
Grade 10	Scientific Inquiries - Chemistry	B		0.50
Grade 10	Scientific Inquiries - Physics	B		0.50
Grade 10	Scientific Inquiries - Biology		C+	0.50
Grade 10	Methods in Scientific Inquiry		B	0.50
Grade 10	Moving and Learning	A	A	0.50
Grade 10	Mandarin Chinese I	A	A	1.00

Diane M Stegmeyer

Registrar 06/10/2015

Academic Program
All IMSA courses are college preparatory.

Explanation of Grades

A	Exceeds course requirements
B	Meets course requirements
C	Needs improvement
D	Does not meet course requirements; no Academy credit awarded
I	Incomplete, course requirements not completed when grades were issued
WF	Withdrawn from course with failing grade; no Academy credit awarded
W	Withdrawn from course; no Academy credit awarded

Pass/Fail Options

P+	Exceeds course requirements (Pass with Distinction, used only in Independent Study and Student Inquiry and Research courses)
P	Meets course requirements; Academy credit may/may not be awarded depending on course grading criteria
F	Does not meet course requirements for course taken pass/fail; no Academy credit awarded

Intersession (one week non-credit course)

S	Satisfactory completion of requirements
U	Unsatisfactory completion of requirements

GPA/Class Ranking Policy
In light of IMSA's selective admission process and in order to promote collaborative exploration and discovery, the Academy does not compute grade point averages and class rankings.

Standardized Test Scores
Standardized test scores are provided by the student.

Student Inquiry and Research
(Inquiry and Mentorship) includes on-campus and off-campus experiences in which students plan, investigate, analyze, and communicate in-depth scholarly investigation, either guided or directed, by scientists, scholars, and/or educators.

TALENT (Total Applied Learning for Entrepreneurs)
Is a program that promotes entrepreneurial applied science and technology.

Federal and State Constitution Requirements
Are fulfilled with successful completion of American Studies.

Physical Education Requirement
Is fulfilled with successful completion (pass) of physical education or wellness.

Notice to persons or agencies receiving student records:
Section 438(b)(4)(B) of U.S. Public Law 93-380 requires that this pupil record information be transferred to you only on condition that you will not permit any other party to have access to it without the written consent of a parent/guardian or eligible student.

IMSA
Illinois Mathematics and Science Academy
1500 Sullivan Road
Aurora IL 60506
Phone 630-907-5066 Fax 630-907-5922